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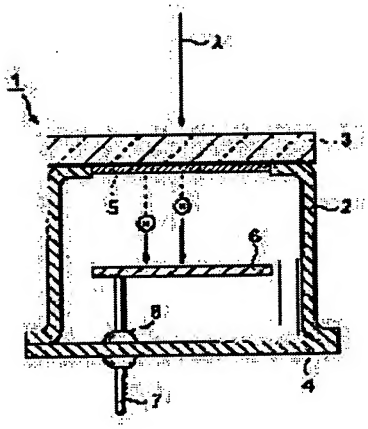
(54) PHOTO-DETECTING TUBE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a photo-detecting tube which selectively detects only the light of wavelength near 360 nm.

SOLUTION: A photo-detecting tube 1 is provided with an incidence window 3 and a photocathode 5, the incidence window 3 is made of covar glass, and the photocathode 5 is made of GaN. The covar glass selectively transmits the light of wavelength ≥ about 290 nm, and the GaN selectively and photoelectrically converts the light of wavelength ≤ about 430 nm. Thus, in the photo-detecting tube, the peak of detecting sensitivity lies in wavelength 360 nm, and only the light of wavelength 360 ± about 70 nm can be selectively detected without an optical band-pass filter.



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* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] It is photodetection tubing characterized by for said entrance window consisting of covar glass, and said photoelectric cathode consisting of GaN in photodetection tubing equipped with the entrance window which makes some vacuum housing outer walls, and the photoelectric cathode which carries out photo electric conversion of the light which has been arranged in said vacuum housing and penetrated said entrance window.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to photodetection tubing, such as the photoelectric tube and the photomultiplier tube.
[0002]
[Description of the Prior Art] Conventionally, the photodiode using Semi-conductor Si as a photodetector which measures the optical reinforcement of the light source is known. Moreover, photodetection tubing, such as the photomultiplier tube, is known as a photodetector which performs photodetection of high sensitivity.
[0003]
[Problem(s) to be Solved by the Invention] However, in above-mentioned photodetection tubing, when acting as the monitor of the reinforcement of the light source which carries out outgoing radiation of the ultraviolet radiation near the wavelength of 360nm, it needed to use together the light filter which has the permeability property of making only the specific wavelength penetrating. That is, the light filter which has 1 or two or more specific wavelength light selection transparency properties ahead [photodetection tubing] in the conventional photodetection tubing has been arranged, and the light which penetrated this was detected. While such a light filter decreased the reinforcement of the transmitted light, it had caused the increment in components mark. This invention is made in order to solve such a technical problem, and it aims at offering photodetection tubing which detects only the light near the wavelength of 360nm alternatively.
[0004]
[Means for Solving the Problem] In photodetection tubing equipped with the photoelectric cathode which carries out photo electric conversion of the light which photodetection tubing concerning this invention has been arranged the entrance window which makes some vacuum housing outer walls, and in a vacuum housing, and penetrated the entrance window, it is characterized by for an entrance window consisting of covar glass, and photoelectric cathode consisting of GaN. Covar glass makes light with a wavelength of about 290nm or more penetrate alternatively, and GaN carries out photo electric conversion of the light with a wavelength of about 430nm or less alternatively. therefore, this photodetection tubing -- setting -- wavelength 360nm**-- only about 70nm light can be detected alternatively, without using an optical band pass filter.
[0005]
[Embodiment of the Invention] Hereafter, photodetection tubing concerning the gestalt of operation is explained. The explanation which overlaps using the same sign is omitted to the element which has the same element or the same function.
[0006] Drawing 1 is drawing of longitudinal section of the photodetection tubing 1 concerning the gestalt of operation. This photodetection tubing 1 is the photoelectric tube, and is equipped with the vacuum housing which closes upper limit opening of the metal by-pass 2 with the face-plate 3 as an entrance window, and comes to close lower limit opening with the stem plate 4. The interior of this vacuum housing is decompressed rather than atmospheric pressure. In this vacuum housing, the photoelectric cathode 5 which carries out photo electric conversion of the light lambda which penetrated the entrance window 3, and the metal anode plate 6 which collects the electrons e emitted from photoelectric cathode 5 are arranged.

[0007] Photoelectric cathode 5 is formed in the inside of an entrance window 3, predetermined potential is given to photoelectric cathode 5 through a by-pass 2, and potential higher than cathode 5 is given to an anode plate 6. For example, if photoelectric cathode 5 is grounded and the potential of 100V is given to an anode plate 6, the electric field which pull Electron e in the anode plate 6 direction inside a vacuum housing according to the electrical potential difference between these will occur. After being accelerated according to an internal field, the electron e generated in photoelectric cathode 5 according to the incidence of Light lambda collides with an anode plate 6, and is taken out outside as the output current through the lead pin 7 electrically connected to the anode plate 6. In addition, the hermetic seal of the clearance between the lead pin 7 and the stem plate 4 is carried out by the charge 8 of a glass reinforcement.

[0008] Drawing 2 is a graph which shows a wavelength-entrance window permeability (%) property, a wavelength-photoelectric-cathode radiant sensitivity (mA/W) property, and the detection sensitivity (mA/W) property of photoelectric-tube 1 the very thing which compounded these. The component beyond wavelength lambda1 penetrates an entrance window 3 among the light lambda which carried out incidence to the entrance window 3. Moreover, photo electric conversion of the component not more than wavelength lambda2 is carried out by photoelectric cathode 5 among the light lambda which carried out incidence to photoelectric cathode 5. Wavelength lambda 2 is longer than wavelength lambda 1, therefore photoelectric-tube 1 the very thing has detection sensitivity between wavelength lambda1-lambda2.

[0009] In addition, the permeability in the wavelength lambda 1 of an entrance window 3 is or less about 1 of the permeability in wavelength lambda1+140nm / 1000, and the radiant sensitivity in the wavelength lambda 2 of photoelectric cathode 5 is or less about 1 of the radiant sensitivity in wavelength lambda2-140nm / 1000.

[0010] The photoelectric tube 1 concerning the gestalt of this operation is equipped with the entrance window 3 which makes some vacuum housing outer walls, and the photoelectric cathode 5 which carries out photo electric conversion of the light lambda which has been arranged in a vacuum housing and penetrated the entrance window 3, and an entrance window 3 consists of covar glass, and photoelectric cathode 5 consists of GaN. Covar glass makes the light more than the wavelength of about 290nm (= lambda 1) penetrate alternatively, and GaN carries out photo electric conversion of the light below the wavelength of about 430nm (= lambda 2) alternatively. therefore, this photoelectric tube -- setting -- near the wavelength of 360nm -- the peak of detection sensitivity -- having -- wavelength 360nm**-- only about 70nm light can be detected alternatively, without using an optical band pass filter. moreover, wavelength 360nm**which gives the peak value of the detection sensitivity of this photoelectric tube -- each detection sensitivity in about 70nm is or less about 1 of the detection sensitivity of peak value / 1000. Moreover, the detection sensitivity in the wavelength of 254nm of this photoelectric tube is or less about 1 of the detection sensitivity of peak value / 1000, and can detect light with a wavelength [of a mercury lamp] of 360nm in distinction from light with a wavelength of 254nm. In addition, the cobber hard glass (KB hard glass) by NEC Vacuum Glass company was used for this covar glass.

[0011] Drawing 3 is drawing of longitudinal section of the photodetection tubing 1 concerning the gestalt of another operation. This photodetection tubing 1 is a photo-multiplier, and is equipped with the vacuum housing which closes upper limit opening of the glass bulb 12 with the face-plate 13 as an entrance window, and comes to close lower limit opening with the stem plate 14. The interior of this vacuum housing is decompressed rather than atmospheric pressure. In this vacuum housing, the photoelectric cathode 15 which carries out photo electric conversion of the light lambda which penetrated the entrance window 13, and the metal anode plate 16 which collects the electrons e emitted from photoelectric cathode 15 are arranged. Moreover, between cathode 15 and an anode plate 16, the electron multiplier which consists of dynodes D1-D5 which carry out multiplication of the electron which carried out incidence is arranged in order.

[0012] Photoelectric cathode 15 is formed in the inside of an entrance window 13, predetermined potential is given to photoelectric cathode 15 through focusing electrodes 19 and 20, and potential higher than cathode 15 is given to dynodes D1-D5 and an anode plate 16. The thin film-like focusing electrode 19 is formed when metals, such as aluminum, are vapor-deposited by glass bulb 12 inside surrounding the space from the photoelectric cathode 15 to the dynode D1 of the 1st step, and the

tabular focusing electrode 20 consists of a metal plate with which a part of periphery contacted the thin film-like focusing electrode 19. The tabular focusing electrode 20 has opening in the center section. It connects with photoelectric cathode 15 electrically, and these focusing electrodes 19 and 20 form the electric field which converge the electron generated in photoelectric cathode 15 in the surrounded space by these with the dynode D1 of the 1st step into the 1st step dynode D1 arranged directly under [opening] a focusing electrode 20.

[0013] If it explains in full detail, a reference potential will be given to photoelectric cathode 15 and focusing electrodes 19 and 20 through the single lead pin 17, and such high potential will be given to dynodes D1-D5 and an anode plate 16 that it becomes the latter part through two or more remaining lead pins 17. For example, if touch-down potential is given to photoelectric cathode 15 and focusing electrodes 19 and 20, the potential of 100V is given to an anode plate 16 and the potential chosen as dynodes D1-D5 from the potential of 0-100V is given, the electric field which pull the electron e generated in photoelectric cathode 15 inside the vacuum housing according to the electrical potential difference between these in the anode plate 16 direction will occur.

[0014] After being accelerated according to an internal field, multiplication of the electron e generated in photoelectric cathode 15 according to the incidence of Light lambda is carried out further, colliding, and multiplication being carried out to the dynode D1 of the 1st step, and carrying out a sequential collision rather than this at the latter dynodes D2-D5, and, finally it collides with an anode plate 16. The electron e collected in the anode plate 16 is taken out outside as the output current through the lead pin 17 electrically connected to the anode plate 16. In addition, the hermetic seal of the clearance between the lead pin 17 and the stem plate 14 is carried out by the charge 18 of a glass reinforcement.

[0015] This photo-multiplier is a photo-multiplier of a box and a grid mold, each dynodes D1-D5 are box molds, and the grid is prepared in the front face. Moreover, although the last stage dynode is arranged near the anode plate 16, it does not illustrate with the gestalt of this operation.

[0016] It has the photoelectric cathode 15 which carries out photo electric conversion of the light lambda which the photomultiplier tube concerning the gestalt of this operation has been arranged the photoelectric tube concerning the gestalt of the above-mentioned implementation, the entrance window 13 which makes some vacuum housing outer walls similarly, and in a vacuum housing, and penetrated the entrance window 13, and an entrance window 13 consists of covar glass, and photoelectric cathode 15 consists of GaN. As mentioned above, covar glass makes the light more than the wavelength of about 290nm (= lambda 1) penetrate alternatively, and GaN carries out photo electric conversion of the light below the wavelength of about 430nm (= lambda 2) alternatively. therefore, this photomultiplier tube -- setting -- the wavelength of 360nm -- the peak of detection sensitivity -- having -- wavelength 360nm**-- only about 70nm light can be detected alternatively, without using an optical band pass filter.

[0017] In addition, although an above-mentioned entrance window and photoelectric cathode were applied to photodetection tubing of the head-on mold which has the photoelectric cathode of a transparency mold, these are also applicable to photodetection tubing which has the photoelectric cathode of a reflective mold, such as a photo-multiplier of a side-on mold, and an image intensifier.

[0018] Drawing 4 is drawing of longitudinal section of the photodetection tubing module 100 which has the above-mentioned photodetection tubing 1 inside. This photodetection tubing module is equipped with the envelopment cylinder 21 which contains the photodetection tubing 1, the cap member 22 which closes upper limit opening of the envelopment cylinder 21, and the closure plate 23 which closes lower limit opening of the envelopment cylinder 21. The cap member 22 has the through tube 24 drilled along with the longitudinal direction of the envelopment cylinder 21, and can lead the light lambda from the module outside to the envelopment cylinder 21 interior through a through tube 24.

[0019] In the envelopment cylinder 21, the optical diffusion plates 25, such as an obscured glass which consists of an ingredient which makes the light of the above-mentioned specific wavelength penetrate at least, are arranged, and the optical diffusion plate 25 is located between the entrance window of the photodetection tubing 1, and the optical outgoing radiation edge of a through tube 24. The optical diffusion plate 25 is closing the optical outgoing radiation edge of a through tube 24, diffuses the light lambda introduced in the through tube 24, and is irradiated in the direction of an

entrance window of the photodetection tubing 1. In addition, it can replace with the optical diffusion plate 25, an etching mesh can be arranged at the optical outgoing radiation edge of a through tube 24, and degradation of photoelectric cathode can also be prevented. The above-mentioned photodetection tubing 1 outputs an electrical signal according to the incidence of the light of specific wavelength. This electrical signal is amplified by the pre amplifier 26 arranged to the envelopment cylinder 21 interior, and is outputted outside through the lead wire which penetrates the closure plate 23. This photodetection tubing module can be used for the light source monitor for ultraviolet curing, the light source monitor for ultrapure water purification, etc.

[0020]

[Effect of the Invention] As mentioned above, as explained, according to photodetection tubing of this invention, only the light of specific wavelength can be detected without using an optical band pass filter, and photodetection can be performed to high sensitivity.

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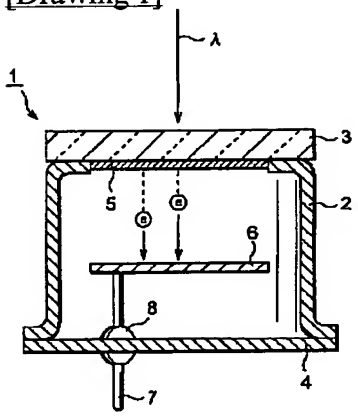
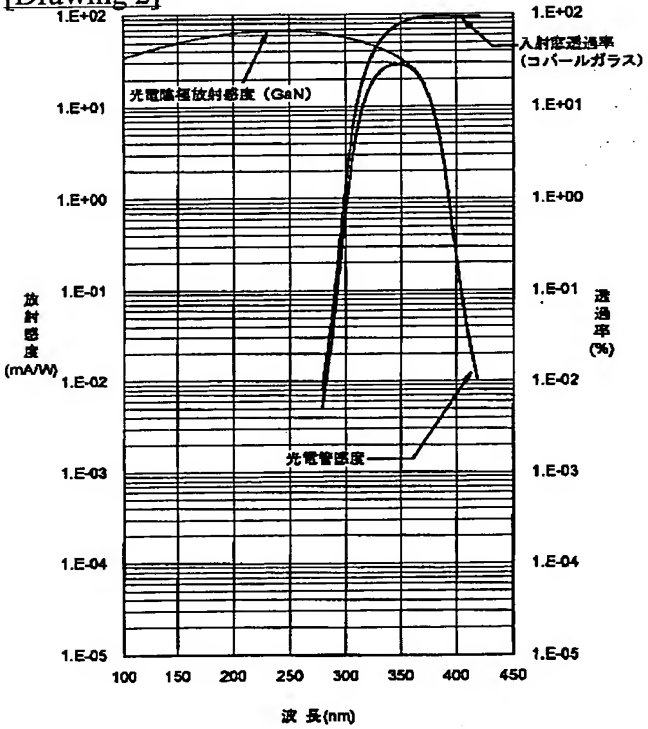
DRAWINGS

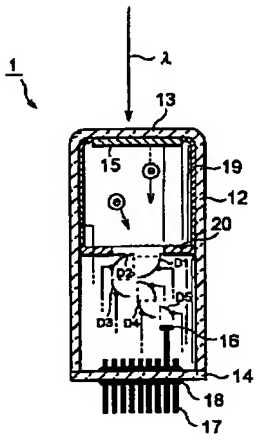
[Drawing 1]



[Drawing 2]



[Drawing 3]



[Drawing 4]

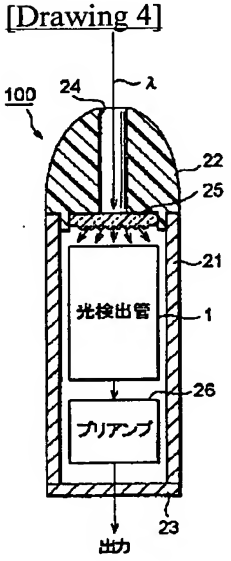


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PHOTO-DETECTING TUBE

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Publication date: 1999-04-13
Inventor: SUZUKI SHINJI; ISOBE YUKIHIRO; OKANO KAZUYOSHI; KUME HIDEHIRO
Applicant: HAMAMATSU PHOTONICS KK
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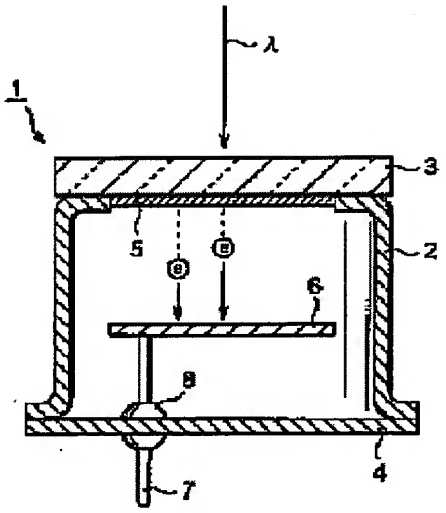
- International: H01J43/28; H01J1/34; H01J40/06
- european:
Application number: JP19970260197 19970925
Priority number(s):

Abstract of **JP11102658**

PROBLEM TO BE SOLVED: To provide a photo-detecting tube which selectively detects only the light of wavelength near 360 nm. SOLUTION: A photo-detecting tube 1 is provided with an incidence window 3 and a photocathode 5, the incidence window 3 is made of covar glass, and the photocathode 5 is made of GaN. The covar glass selectively transmits the light of wavelength >= about 290 nm, and the GaN selectively and photoelectrically converts the light of wavelength <= about 430 nm. Thus, in the photo-detecting tube, the peak of detecting sensitivity lies in wavelength 360 nm, and only the light of wavelength 360 ± about 70 nm can be selectively detected without an optical band-pass filter.



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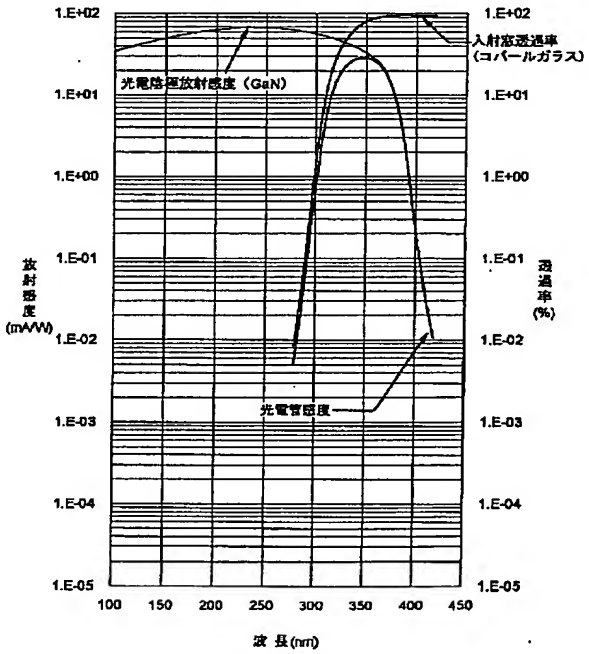
最終頁に続く

(54)【発明の名称】　光検出管

(57)【要約】

【課題】　波長３６０ｎｍ付近の光のみを選択的に検出する光検出管を提供する。

【解決手段】　本光検出管１は、入射窓１３及び光電陰極１５を備えており、入射窓１３はコバールガラスからなり、且つ、光電陰極１５はＧａＮからなる。コバールガラスは波長約２９０ｎｍ以上の光を選択的に透過させ、ＧａＮは波長約４３０ｎｍ以下の光を選択的に光電変換する。したがって、本光検出管においては、波長３６０ｎｍに検出感度のピークを有し、波長３６０ｎｍ±約７０ｎｍの光のみを光学的バンドパスフィルタを用いることなく選択的に検出することができる。



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【特許請求の範囲】

【請求項１】　真空容器外壁の一部をなす入射窓と、前記真空容器内に配置され前記入射窓を透過した光を光電変換する光電陰極とを備えた光検出管において、前記入射窓はコバールガラスからなり、且つ、前記光電陰極はＧａＮからなることを特徴とする光検出管。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、光電管や光電子増倍管等の光検出管に関する。

【０００２】

【従来の技術】従来、光源の光強度を測定する光検出器として、半導体Ｓｉを用いたフォトダイオードが知られている。また、高感度の光検出を行う光検出器として光電子増倍管等の光検出管が知られている。

【０００３】

【発明が解決しようとする課題】しかしながら、上述の光検出管においては、波長３６０ｎｍ付近の紫外光を出射する光源の強度をモニターする場合、その特定波長のみを透過させる透過率特性を有する光学フィルタを併用することを必要とした。すなわち、従来の光検出管においては光検出管前方に１又は２以上の特定波長光選択透過特性を有する光学フィルタを配置し、これを透過した光を検出していた。このような光学フィルタは、透過光の強度を減少させると同時に部品点数の増加を招いていた。本発明は、このような課題を解決するためになされたものであり、波長３６０ｎｍ付近の光のみを選択的に検出する光検出管を提供することを目的とする。

【０００４】

【課題を解決するための手段】本発明に係る光検出管は、真空容器外壁の一部をなす入射窓と、真空容器内に配置され入射窓を透過した光を光電変換する光電陰極とを備えた光検出管において、入射窓はコバールガラスからなり、且つ、光電陰極はＧａＮからなることを特徴とする。コバールガラスは波長約２９０ｎｍ以上の光を選択的に透過させ、ＧａＮは波長約４３０ｎｍ以下の光を選択的に光電変換する。したがって、本光検出管においては、波長３６０ｎｍ±約７０ｎｍの光のみを光学的バンドパスフィルタを用いることなく選択的に検出することができる。

【０００５】

【発明の実施の形態】以下、実施の形態に係る光検出管について説明する。同一要素又は同一機能を有する要素には同一符号を用いるものとし、重複する説明は省略する。

【０００６】図１は、実施の形態に係る光検出管１の縦断面図である。本光検出管１は光電管であり、金属製側管２の上端開口部を、入射窓としての面板３で封止し、下端開口部をステム板４で封止してなる真空容器を備える。本真空容器の内部は大気圧よりも減圧されている。

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本真空容器内には、入射窓３を透過した光λを光電変換する光電陰極５と、光電陰極５から放出された電子ｅを収集する金属製の陽極６とが配置されている。

【０００７】光電陰極５は入射窓３の内面に形成されており、光電陰極５には側管２を介して所定の電位が与えられ、陽極６には陰極５よりも高い電位が与えられる。例えば光電陰極５を接地し、陽極６に１００Ｖの電位を与えると、これらの間の電圧に従って真空容器内部に電子ｅを陽極６方向へ引っ張る電界が発生する。光λの入射に応じて光電陰極５で発生した電子ｅは、内部電界にしたがって加速された後、陽極６に衝突し、陽極６に電気的に接続されたリードピン７を介して出力電流として外部に取りだされる。なお、リードピン７とステム板４との間の隙間はガラス充填材料８によって気密封止されている。

【０００８】図２は、波長－入射窓透過率（％）特性、波長－光電陰極放射感度（ｍＡ／Ｗ）特性、及びこれらを合成した光電管１自体の検出感度（ｍＡ／Ｗ）特性を示すグラフである。入射窓３に入射した光λのうち、波長λ_1以上の成分は入射窓３を透過する。また、光電陰極５に入射した光λのうち、波長λ_2以下の成分は光電陰極５によって光電変換される。波長λ_1は波長λ_2よりも長く、したがって、光電管１自体は、波長λ_1～λ_2の間に検出感度を有する。

【０００９】なお、入射窓３の波長λ_1における透過率は波長λ_1＋１４０ｎｍにおける透過率の約１／１０００以下であり、光電陰極５の波長λ_2における放射感度は波長λ_2－１４０ｎｍにおける放射感度の約１／１０００以下である。

【００１０】本実施の形態に係る光電管１は、真空容器外壁の一部をなす入射窓３と、真空容器内に配置され入射窓３を透過した光λを光電変換する光電陰極５を備え、入射窓３はコバールガラスからなり、且つ、光電陰極５はＧａＮからなる。コバールガラスは波長約２９０ｎｍ（＝λ_1）以上の光を選択的に透過させ、ＧａＮは波長約４３０ｎｍ（＝λ_2）以下の光を選択的に光電変換する。したがって、本光電管においては、波長３６０ｎｍ付近に検出感度のピークを有し、波長３６０ｎｍ±約７０ｎｍの光のみを光学的バンドパスフィルタを用いることなく選択的に検出することができる。また、本光電管の検出感度のピーク値を与える波長３６０ｎｍ±約７０ｎｍにおけるそれぞれの検出感度は、ピーク値の検出感度の約１／１０００以下である。また、本光電管の波長２５４ｎｍにおける検出感度は、ピーク値の検出感度の約１／１０００以下であり、水銀ランプの波長３６０ｎｍの光を波長２５４ｎｍの光と区別して検出することができる。なお、本コバールガラスは、日本電気真空硝子（株）社製のコバー硬質ガラス（ＫＢ硬質ガラス）を用いた。

【００１１】図３は、別の実施の形態に係る光検出管１

の縦断面図である。本光検出管１は光電子増倍管であり、ガラスバルブ１２の上端開口部を、入射窓としての面板１３で封止し、下端開口部をステム板１４で封止してなる真空容器を備える。本真空容器の内部は大気圧よりも減圧されている。本真空容器内には、入射窓１３を透過した光λを光電変換する光電陰極１５と、光電陰極１５から放出された電子ｅを収集する金属製の陽極１６とが配置されている。また、陰極１５と陽極１６との間には入射した電子を増倍するダイノードD_1～D_5からなる電子増倍器が順番に配置されている。

【００１２】光電陰極１５は入射窓１３の内面に形成されており、光電陰極１５には集束電極１９，２０を介して所定の電位が与えられ、ダイノードD_1～D_5及び陽極１６には陰極１５よりも高い電位が与えられる。薄膜状集束電極１９は光電陰極１５から第１段目のダイノードD_1までの空間を囲むガラスバルブ１２内面にアルミ等の金属が蒸着されることによって形成され、板状集束電極２０は外周の一部分が薄膜状集束電極１９に接触した金属板からなる。板状集束電極２０は中央部に開口を有している。これらの集束電極１９，２０は、光電陰極１５に電気的に接続されており、第１段目のダイノードD_1と共に、これらによった囲まれた空間内に光電陰極１５で発生した電子を集束電極２０の開口直下に配置された第１段ダイノードD_1内に集束させる電界を形成する。

【００１３】詳説すれば、光電陰極１５及び集束電極１９，２０には単一のリードピン１７を介して基準電位が与えられ、ダイノードD_1～D_5及び陽極１６には、残りの複数のリードピン１７を介して後段になるほど高い電位が与えられる。例えば光電陰極１５及び集束電極１９，２０に接地電位を与え、陽極１６に１００Ｖの電位を与え、ダイノードD_1～D_5に０～１００Ｖの電位から選択される電位を与えると、これらの間の電圧に従って真空容器内部に光電陰極１５で発生した電子ｅを陽極１６方向へ引っ張る電界が発生する。

【００１４】光λの入射に応じて光電陰極１５で発生した電子ｅは、内部電界にしたがって加速された後、第１段目のダイノードD_1に衝突して増倍され、これよりも後段のダイノードD_2～D_5に順次衝突しながらさらに増倍され、最終的に陽極１６に衝突する。陽極１６で収集された電子ｅは、陽極１６に電気的に接続されたリードピン１７を介して出力電流として外部に取りだされる。なお、リードピン１７とステム板１４との間の隙間はガラス充填材料１８によって気密封止されている。

【００１５】本光電子増倍管は、ボックスアンドグリッド型の光電子増倍管であり、各ダイノードD_1～D_5はボックス型であって、その前面にはグリッドが設けられている。また、陽極１６の近傍には最終段ダイノードが配置されているが、本実施の形態では図示しない。

【００１６】本実施の形態に係る光電子増倍管は、上記

実施の形態に係る光電管と同様に、真空容器外壁の一部をなす入射窓１３と、真空容器内に配置され入射窓１３を透過した光λを光電変換する光電陰極１５とを備え、入射窓１３はコバールガラスからなり、且つ、光電陰極１５はＧａＮからなる。上述のように、コバールガラスは波長約２９０ｎｍ（＝λ_1）以上の光を選択的に透過させ、ＧａＮは波長約４３０ｎｍ（＝λ_2）以下の光を選択的に光電変換する。したがって、本光電子増倍管においては、波長３６０ｎｍに検出感度のピークを有し、波長３６０ｎｍ±約７０ｎｍの光のみを光学的バンドパスフィルタを用いることなく選択的に検出することができる。

【００１７】なお、上述の入射窓及び光電陰極は、透過型の光電陰極を有するヘッドオン型の光検出管に適用したが、これらは反射型の光電陰極を有するサイドオン型の光電子増倍管やイメージインテンシファイア等の光検出管に適用することもできる。

【００１８】図４は、上記光検出管１を内部に有する光検出管モジュール１００の縦断面図である。本光検出管モジュールは、光検出管１を収納する包囲筒２１と、包囲筒２１の上端開口部を封止するキャップ部材２２と、包囲筒２１の下端開口部を封止する封止板２３とを備える。キャップ部材２２は、包囲筒２１の長手方向に沿って穿設された貫通孔２４を有しており、モジュール外部からの光λを貫通孔２４を介して包囲筒２１内部に導くことができる。

【００１９】包囲筒２１内には上記特定波長の光を少なくとも透過させる材料からなるスリガラス等の光拡散板２５が配置されており、光拡散板２５は光検出管１の入射窓と貫通孔２４の光出射端との間に位置する。光拡散板２５は貫通孔２４の光出射端を封止しており、貫通孔２４内に導入された光λを拡散して光検出管１の入射窓方向へ照射する。なお、光拡散板２５に代えてエッチングメッシュを貫通孔２４の光出射端に配置し、光電陰極の劣化を防止することもできる。上述の光検出管１は、特定波長の光の入射に応じて電気信号を出力する。この電気信号は包囲筒２１内部に配置されたプリアンプ２６で増幅され、封止板２３を貫通するリード線を介して外部に出力される。本光検出管モジュールは、紫外線硬化用光源モニタや超純水精製用光源モニタ等に用いることができる。

【００２０】

【発明の効果】以上、説明したように、本発明の光検出管によれば、特定波長の光のみを光学的バンドパスフィルタを用いることなく検出することができ、高感度に光検出を行うことができる。

【図面の簡単な説明】

【図１】実施の形態に係る光電管の縦断面図。

【図２】波長－入射窓透過率（％）特性、波長－光電陰極放射感度（ｍＡ／Ｗ）特性、及びこれらを合成した光

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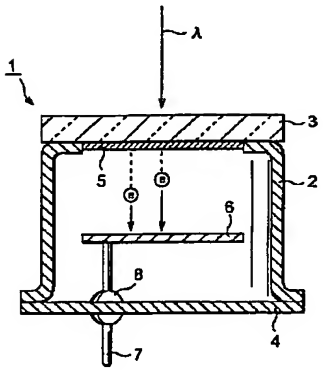
電管１自体の検出感度特性を示すグラフ。　　＊面図。

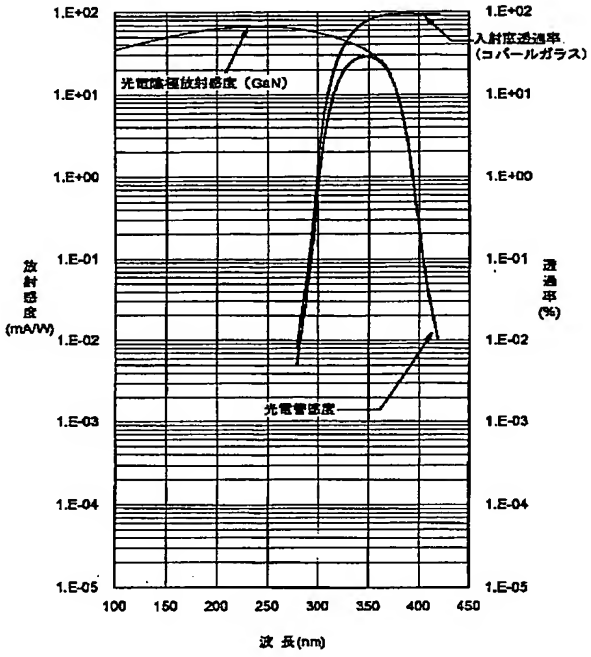
【図３】実施の形態に係る光電子増倍管の縦断面図。　　【符号の説明】

【図４】光検出管を内蔵した光検出管モジュールの縦断＊　　１…光検出管、１３…入射窓、１５…光電陰極。

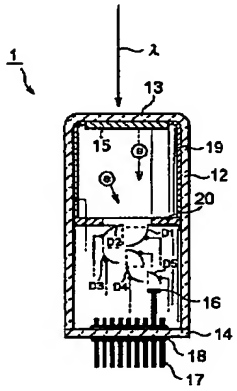
【図１】



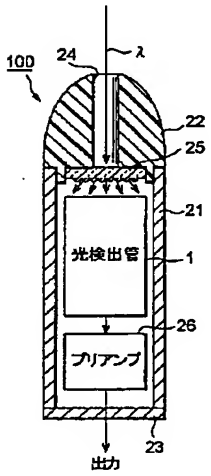
【図２】



【図３】



【図４】



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